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1640 Oct. 9	.	.	.	16 36 h. 8 p. m.
10	.	.	.	16 36
27	.	.	.	15 38 h 7 p. m.
29	.	.	.	15 41
30	.	.	.	15 43
31	.	.	.	15 49

These may suffice to prove, that Mr. Gascoigne's micrometer was not a mere thing in embryo, but brought to a good degree of perfection above 40 years before that of the French gentlemen was ever so much as mention'd. I am,

S I R,

Red-lion street, Clerkenwell, Your very humble servant,  
May 10, 1753.

J. Bevis.

XXX. *Observations of the Transit of Mercury over the Sun, May 6, 1753; by Mr. J. Short, F. R. S.*

Read May 17, 1753. **T**HE instrument prepared for these observations was a reflecting telescope, of two feet focal length, of the Gregorian form, magnifying about 65 times, and so constructed in its machinery as to move in a plane parallel to the horizon, and also, when required, to move in a plane parallel to the equator. This telescope had two eye-pieces, each a combination of two glasses, *viz.* one eye-piece for the horizontal motion, with wires at right angles to one another, the wires being between the

the glasses, and one of the wires placed parallel to the horizon, and consequently the other was vertical; the other eye-piece was also a combination of two glasses, and adapted to a micrometer, the glasses being placed between the wires of the micrometer and the eye of the observer, and was to be used when the telescope moved in a plane parallel to the equator.

Mr. Short's house, in Surry-street, being so situated as not to see the sun at rising, the Rev. Dr. Birch, Secretary of the Royal Society, was pleased to allow us the use of his leads on his house in Norfolk-street, from whence we should be enabled to see the sun soon after he rose. We chose the doctor's leads, that we might not be far from Mr. Short's clock, which was easily within call, in order to compare a second-watch, which we made use of, with the clock, at every observation.

About half an hour after 4 o'clock in the morning of the 6th of May, Dr. Bevis and Mr. Short went to Dr. Birch's house, where the following observations were taken with the above reflecting telescope moving parallel to the horizon, and the eye-piece with the wires at right angles; Dr. Bevis observing, and Mr. Short writing down the times.

By Mr. Short's clock.

h    '    "

I.

- |   |    |                 |   |
|---|----|-----------------|---|
| 5 | 20 | 25              | ☉ upper limb at the horizontal wire.    |
|   | 20 | 29              | ☉ preceding limb at the vertical wire.  |
|   | 22 | 9 $\frac{1}{2}$ | ☿ center at the vertical wire.          |
|   | 22 | 33              | ☿ center at the horizontal wire.        |
|   | 23 | 19              | ☉ subsequent limb at the vertical wire. |
|   | 24 | 0               | ☉ under limb at the horizontal wire.    |

B b

II.

By Mr. Short's clock.

h r "

II.

- 5 25 24 ☉ upper limb at the horizontal wire.  
 25 27 ☉ preceding limb at the vertical wire.  
 5 27  $5\frac{1}{2}$  ♀ center at the vertical fine.  
 27 34 ♀ center at the horizontal wire.  
 28  $17\frac{1}{2}$  ☉ subsequent limb at the vertical wire..  
 29  $0\frac{1}{2}$  ☉ lower limb at the horizontal wire.

III.

- 31 45 ☉ upper limb at the horizontal wire..  
 31  $55\frac{1}{2}$  ☉ preceding limb at the vertical wire.  
 33 32 ♀ center at the vertical wire.  
 33  $52\frac{1}{2}$  ♀ center at the horizontal wire.  
 34 47 ☉ subsequent limb at the preceding wire..  
 35  $20\frac{1}{2}$  ☉ under limb at the horizontal wire.

IV.

- 36  $44\frac{1}{2}$  ☉ upper limb at the upper wire..  
 36 54 ☉ preceding limb at the vertical wire..  
 38 29 ♀ center at the vertical wire.  
 38  $49\frac{1}{4}$  ♀ center at the horizontal wire.  
 39  $45\frac{1}{2}$  ☉ subsequent limb at the vertical wire.  
 40 18 ☉ under limb at the horizontal wire.

V.

- 41 8 ☉ upper limb at the horizontal wire..  
 41 25 ☉ preceding limb at the vertical wire.  
 42  $57\frac{1}{2}$  ♀ center at the vertical wire.  
 43 13 ♀ center at the horizontal wire.  
 44 16 ☉ subsequent limb at the vertical wire..  
 44 39 ☉ under limb at the horizontal wire.

VI.

- 47  $45\frac{1}{2}$  ☉ upper limb at the horizontal wire.  
 47  $52\frac{1}{2}$  ☉ preceding limb at the vertical wire.

# [ 195 ]

By Mr. Short's clock.

h r n

- 5 49 23 ♀ center at the vertical wire.  
 49 52 ♀ center at the horizontal wire.  
 50 53 $\frac{1}{2}$  ⊙ subsequent limb at the vertical wire.  
 51 19 ⊙ under limb at the horizontal wire.

## VII.

- 55 44 $\frac{3}{4}$  ⊙ upper limb at the horizontal wire.  
 55 51 $\frac{1}{2}$  ⊙ preceding limb at the vertical wire.  
 57 19 $\frac{3}{4}$  ♀ center at the vertical wire.  
 57 48 ♀ center at the horizontal wire.  
 58 44 ⊙ subsequent limb at the vertical wire.  
 59 15 $\frac{1}{4}$  ⊙ under limb at the horizontal wire.

## VIII.

- 6 1 29 ⊙ upper limb at the horizontal wire.  
 1 37 $\frac{1}{4}$  ⊙ preceding limb at the vertical wire.  
 3 4 ♀ center at the vertical wire.  
 3 32 $\frac{1}{2}$  ♀ center at the horizontal wire.  
 4 31 $\frac{3}{4}$  ⊙ subsequent limb at the vertical wire.  
 4 58 ⊙ under limb at the horizontal wire.

## IX.

- 5 31 $\frac{1}{2}$  ⊙ upper limb at the horizontal wire.  
 5 39 $\frac{1}{2}$  ⊙ preceding limb at the vertical wire.  
 7 5 ♀ center at the vertical wire.  
 7 33 $\frac{3}{4}$  ♀ center at the horizontal wire.  
 8 33 ⊙ subsequent limb at the vertical wire.  
 9 1 $\frac{1}{2}$  ⊙ under limb at the horizontal wire.

## X.

- 13 42 $\frac{1}{4}$  ⊙ upper limb at the horizontal wire.  
 13 45 ⊙ preceding limb at the vertical wire.

B b 2

[ 196 ]

By Mr. Short's clock.

h	'	"	
6	15	8	♀ center at the vertical wire.
	15	41	♀ center at the horizontal wire.
	16	39	⊙ subsequent limb at the vertical wire.
	17	8 $\frac{1}{2}$	⊙ under limb at the horizontal wire.

### XI.

18	17	⊙	upper limb at the horizontal wire.
18	22 $\frac{1}{2}$	⊙	preceding limb at the vertical wire.
19	44 $\frac{1}{2}$	♀	center at the vertical wire.
20	17 $\frac{1}{2}$	♀	center at the horizontal wire.
21	17	⊙	subsequent limb at the vertical wire.
21	44 $\frac{1}{2}$	⊙	under limb at the horizontal wire.

About half an hour after 6, Dr. Bevis and Mr. Short went to Mr. Short's house, the sun then shining into his windows, in order to be near the clock, where the following observations were made in the same manner as before, Dr. Bevis observing, and Mr. Short writing down the times, in the presence of the right honourable James Earl of Morton, a fellow of this Society.

By Mr. Short's clock.

### XII.

h	'	"	
7	1	32	⊙ upper limb at the horizontal wire.
	1	43 $\frac{1}{2}$	⊙ preceding limb at the vertical wire.
	2	50	♀ center at the vertical wire.
	3	24 $\frac{1}{2}$	♀ center at the horizontal wire.
	4	39	⊙ subsequent limb at the vertical wire.
	4	57	⊙ under limb at the horizontal wire.

### XIII.

[ 197 ]  
By Mr. Short's clock.  
XIII.

h	i	"	
7	6	$35\frac{1}{2}$	☉ upper limb at the horizontal wire.
	6	$41\frac{1}{2}$	☉ preceding limb at the vertical wire.
	7	$45\frac{1}{2}$	☿ center at the vertical wire.
	8	$28\frac{1}{2}$	☿ center at the horizontal wire.
	9	$35\frac{1}{2}$	☉ subsequent limb at the vertical wire.
10	0	$\frac{1}{2}$	☉ subsequent limb at the horizontal wire.

The telescope, which hitherto moved parallel to the horizon, was now altered, to move parallel to the equator, and the eye-piece with the micrometer was applied, about half an hour after seven o' clock, Mr. Short observing, and Dr. Bevis writing down the times of observation.

h	i	"	
7	31	33	distance between the center of ☿ and ☉'s under limb = 19 rev. 6 parts of the mi- crometer.
	36	$7\frac{1}{2}$	☉'s preceding limb at the horary wire.
	36	$56\frac{1}{2}$	☿ center at the horary wire.
	37	56	☿ center distant from the ☉'s upper limb = 34 rev. 14 parts.
	41	33	☉'s preceding limb at the horary wire.
	42	$21\frac{1}{2}$	☿ center at the horary wire.
	43	21	☿ center distant from the ☉ upper limb = 34 rev. 23 parts.
	44	34	☉ preceding limb at the horary wire.
	45	$21\frac{1}{2}$	☿ center at the horary wire. At the same time ☿ distance from ☉ upper limb = 34 rev. 29 parts.

h ' D

- 8 4 25 ☉ preceding limb at the horary wire.  
 5 7 ♀ center at the horary wire. At the same  
 time ♀ distance from ☉ upper limb =  
 35 rev. 29 parts.  
 6 37½ ☉ subsequent limb at the horary wire.
- 16 25¾ ☉ preceding limb at the horary wire.  
 17 6 ♀ center at the horary wire. At the same  
 time ♀ distance from ☉ upper limb =  
 36 rev. 19 parts.  
 18 39 ☉ subsequent limb at the horary wire.
- 44 1½ ☉ preceding limb at the horary wire.  
 44 35½ ♀ center at the horary wire. Presently  
 after ♀ distance from ☉ upper limb =  
 37 rev. 28 parts.  
 46 14 ☉ subsequent limb at the horary wire.

The sun's diameter perpendicular to the equator was taken in the micrometer of the reflecting telescope at 7<sup>h</sup> 25', and found to be = 53 rev. 13 parts, = 31' 50".

The sun's diameter perpendicular to the equator was taken in the micrometer of the 12 foot refracting telescope (which belonged to the late Mr. Graham) at about half an hour after 9 o'clock, and found to be equal to 51 rev. 14 parts, = 31' 51".

*Note,* The reflector's micrometer has 35 parts in one revolution of the screw; and the refractor's micrometer has 37 parts in one revolution of the screw.

Mr.



Mr. Short observed the last internal contact of mercury with the sun, with a four foot focal length reflector, magnifying about 135 times, at  $10^h 5' 7''$  by the clock, uncertain to 2 or  $3''$ ; and the total egress at  $10^h 7' 42''$  by the clock; uncertain to 5 or  $6''$ , the air then undulating thro' thin clouds.

Dr. Bevis observed the last internal contact with a two foot focal length reflector, magnifying about 65 times, at  $10^h 5'$ , and the total egress at  $10^h 7' 38''$ , by the clock.

Mr. Siffon, at Beaufort-Buildings in the Strand, observed the total egress at  $10^h 7' 43''$ , by Mr. Short's clock, thro' a five foot refracting telescope.

Mr. Bird, at his house in York-Buildings, observed the last internal contact at  $10^h 4' 57''$ ; and the total egress at  $10^h 7' 43''$ , by Mr. Short's clock, thro' a nine inch focal length reflector.

Mr. Smeaton in Furnival's-Inn-Court, Holborn, observed the total egress at  $10^h 8' 30''$ , by Mr. Short's clock, thro' a six foot refracting telescope. — He suspects his time some seconds too late, a cloud having just passed off the sun, when he perceived Mercury was gone.

Mr. Canton, in Spital-square, observed the total egress at  $10^h 8' 12''$ , mean time, thro' a reflecting telescope, three feet focal length.

Mr. Short's house in Surrey-street is  $26''$  of time west of the royal observatory at Greenwich.

*N. B.* Mr. Short's clock, by which these observations were made, was found to be  $28'$  slower than mean time: but, for more satisfaction, here are the sun's passages over the meridian, taken by the transitory.

May

May 7, Sun's preceding limb passed the	h	'	"
meridian at	-	-	11 54 38
Subsequent limb passed the mer.	11	56	51½
May 8, Sun's preceding limb passed the			
meridian, at	-	-	11 54 34½
Subsequent limb passed the me-			
ridian, at	-	-	11 56 47½

*N. B.* This clock, by repeated observations, was not found to have varied above 1" since the 22 of February last to the day of observation.

In the observatory of the right honourable the Earl of Macclesfield, at Shirburn-Castle in Oxfordshire, the total egress was observed at 10<sup>h</sup> 8' 11", apparent time. Latitude of Shirburn-Castle is 51° 39' 25", and its longitude is 4' 0" of time, west of Greenwich observatory.